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and impregnated it with a known proportion of Gall: then by degrees I let fall into it the Salt of Iron, until I found it thereby as deeply tinged red, as the same quantity of *Farrington*-waters would be by the same proportion of Gall: The quantity of the Salt of Iron, that performed this, was near two grains. This water, so tinged, tasted and smelt just as the natural water from the Spring with Gall did: If I added a greater proportion of Salt, it would make it nauseous and Emetical. *Sherborn, Decemb. 17. 1669.*

The Causes of Mineral Springs further inquired: And the strange and secret Changes of Liquors examined; by Dr. F. Beale, to the Publisher.

Sir;

I Am much obliged to my honored Friend Dr H. for his *Analysis* of Mineral Springs, and his *Animadversions* relating to that Argument. I offer no Objection against the Note, that some Waters do lick up the Salts, before they be perfectly fixt in the Materials of Metals: Only this I humbly propose for further Inquiry; Whether some Waters, by their long passage through sub-terraneous steams of divers kinds, and by heats and coolings, and by many changes of these, and by several kinds of strainings, by collisions, and manifold alterations of the texture of their minute parts may not first acquire some Metallin Tincture; and thence assist the Generation of Perfect Metals, if they meet with fit materials; Or if they should be further concocted, before they be intercepted by opening the Spring? If this may sometimes fall out, then we may in such cases avoid the difficulty of undertaking, that Metals, there continued hundreds of years, are imperfect and in *fieri*. And perhaps the *Chalybeat* and other Metalline Spirits may be purer and more thoroughly deopilative, before they be embodied into firm Metals, than after they are by Fire extracted. And then this may be a secret cause, why some Springs prove effectually Medical, when other Medicins do faile.

Learned *Varro* saith, *Tellus Mater omnium*. And we can easily apprehend, that all solid Bodies, even Gold and firmest

Jewels, though they seem strong enough to hold out a Platonical Revolution, do nevertheless naturally tend to a Terrestrial Diffolution. And some of the Ancient Philosophers have conceived, that *Water is the Mother* to Earth itself, And they seem to have the greatest Authority, as well as good Reasons on their side. And Honourable Mr *Boyle* hath by choice Experiments taught us, that Water may have her turn to put in her claim for a Maternal right; and to be as much a Principle, as any of the other which we call Elements. And it seems to hold a kind of Middle Station between Earth and Air; apt to be condensed into the former or to be expanded into the latter; and to have a nearer alliance to running Metals, splendid Gems, and transparent Minerals, than Earth can have.

But *Tachenius* in your *Numb. 50.* offers more closely, the *Various Salts*, especially of the *Alcaly's*, and Acids, to be the Principles of all mixt Bodies. I cannot doubt, but that they are generally necessary Ingredients {and powerful Agents for Generation: And perhaps there are as many kinds of Salts, as there are Earths, Minerals, Stones, Metals, Vegetables, Tasts, &c. from the sweetest Sugar to the most dispatching *Menstruum*; Yet many of them by their expedite Volatility, and some by by their inclination to unite firmly with water, as in Glass, do shew a more than ordinary congeniality and friendly agreement with the purest liquids, Air and Water.

But to decline intricate Theory's, and therewithal the subtilties and difficulties of determining, Whether Salt or Water be the nearer or more original Principle; or the more copious, more active, or more influencing in this or that Body: This we have before our eyes; The Birch and Alder feed more kindly on a chinuliginous moisture, the Elme, Pine, Firr, Pitch, and Cypress, chuse a stronger liquor; yet these and many more of the widest difference, are sometimes seen to draw their whole sustenance, bulk and ornaments, whether annual or perennial, from the liquors they find in the same piece of ground, and from the ambient Air, and Dews; when as yet by our best diligence we cannot distinguish the Liquors or Salts close'y approaching their several Roots. And we may exchange all the Earth totally from the Roots of Trees, whose Barks, Sap, Fruit, and seed

Seed have very much differing-Salts, and are of very different kinds; and yet see each Tree prosper the better by the Exchange. Hence we may suspect, that the very contextures of their Bodies, from the first spirting of their seed, and as they are form'd gradually from the Invisible Principles or Spirit and vigor of their Seeds, however small and imperceptible, are the *natural Limbecs*, where the common Raine, Water, and Air, are digested into very much differing Leaves, Fruit, Seed, Refins, Gums, cooling Julips, &c. perhaps as the Cow's belly converts the common juyce of all sorts of Grass into Milk; or as the Bee ferments the dew of all Flowers into Honey and Wax.

We see also, that an handful of Moss, sometimes above a span long, and resembling Vegetables, grows out of a small Oyster-shel, without Earth, dirt, or sand for the relief of the Root; Trees out of bare Rocks, and the annual attire of Harts and Bucks out of their bony Heads. Whence we may easily apprehend, how the Seeds in their time, and afterwards the Roots, Stems and Leaves of Trees, may be the proper Strainers to generate the peculiar saps and Juyces; and perhaps to ferment and boyle the Liquors into their several Salts. It may pass for a resemblance, if not for an instance, that the Juyce of some sweet Pears may be dryed into a very sweet Sugar; and the Juyce of some other Pears is so fierce, that at the very opening of the Rind with the teeth, it doth almost suffocate, as if it would kill dead immediately; and yet this Juyce by time and seasonable maturation becomes sweet, winy, and luscious. And we hear of divers Exotick fruits that will kill outright; and that so quick, as may challenge the fiercest *Menstruum* of an expert Chymist. Now, as the Horns of a Stag have their whole growth and virtue from the protruding Bloud and Spirits of the Animal; the Moss (as by the Microscope appears, when withered) from the inward shel of the Oyster and the Marine Water; so in Plants, the Sap may by Heats and Coolers, and other changes in Summer, Autumn and Winter, by Winds, and compressing Air, be hardened in o the Timber, Seeds and their Stones and Kernels. All seems to be but sap at the first draught, or little else besides

pure Air and Water, till these be concreted into peculiar Salts by more curious Strainers, and by more subtil Boylers than Art hath hitherto devised. And with no less probability Mineral Waters may acquire their proper Salts in their subterraneous passages by their Strainers and Conveyances, by the various Temper they meet with, and by their dashes, and following changes of contexture. But this I leave to further inquiry.

And this was my Ayme in your Tract 43. p. 855; where by a slight and cursory allusion I compared the Motion of Sap in Vegetables to the descent of Liquors in an Alembick. I had no thought of squaring the comparison to agree in all circumstances. And here also I pretend to very little more than allusions all along. It requires deeper work, a larger compass, and a closer attention to establish a General Theory upon the Intrigues of Vegetation, and of all Saline Operations: The very Air may (for ought I know) afford store and variety of Salt to dash the Foundations of my Overtures, at least as far as pertains to Vegetables. And the Mineral Salts have their recesses deeper, than I can dive, and their activities are swifter, than I have skil or leisure to trace.

Neither had I any phancy, that the Sap in Winter descended to the Root, since I saw an Aple-tree, that yielded 4 or 5 Hogsheads of strong Cider yearly; and a Pear-tree, that yielded more Perry; yet both growing on a dry ground, where they could get no other liquor then what the Clouds and the Air afforded: Yet I conceive, that these Trees have an intercourse of peculiar spirits some way linked together, and vigorously co-operating, from the very Fibers of the lowest Roots to the Top-leaves. And of this I had some wariness, when I expressed the correspondence between the Timber and Seeds in these terms—*more immediate and peculiar*, Numb. 46. p. 920.

But I have no fondness for those Notes, which bear my name in your *Tracts* of N. 43. and 46; They were hastily dictated, neither reviewed, nor fitted for the publick; otherwise I should have promis'd less and perhaps prov'd more. If the Impertinences, Incoherences and discolorations may be pardon'd I can ask no other favour for those Scribes. *Infam.*